

FIGURE 1: Service interface for a software service named 'GetStockQuote'

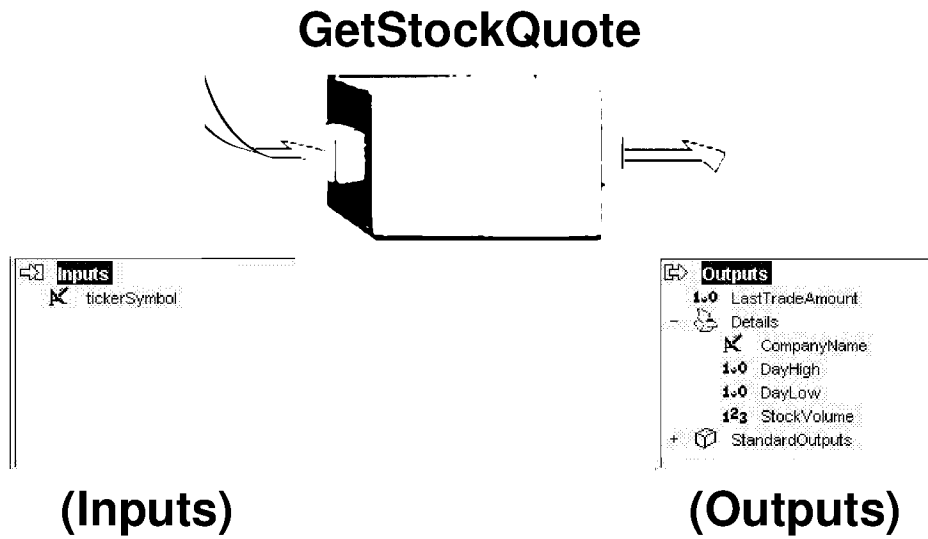


FIGURE 2: Composite service implementation

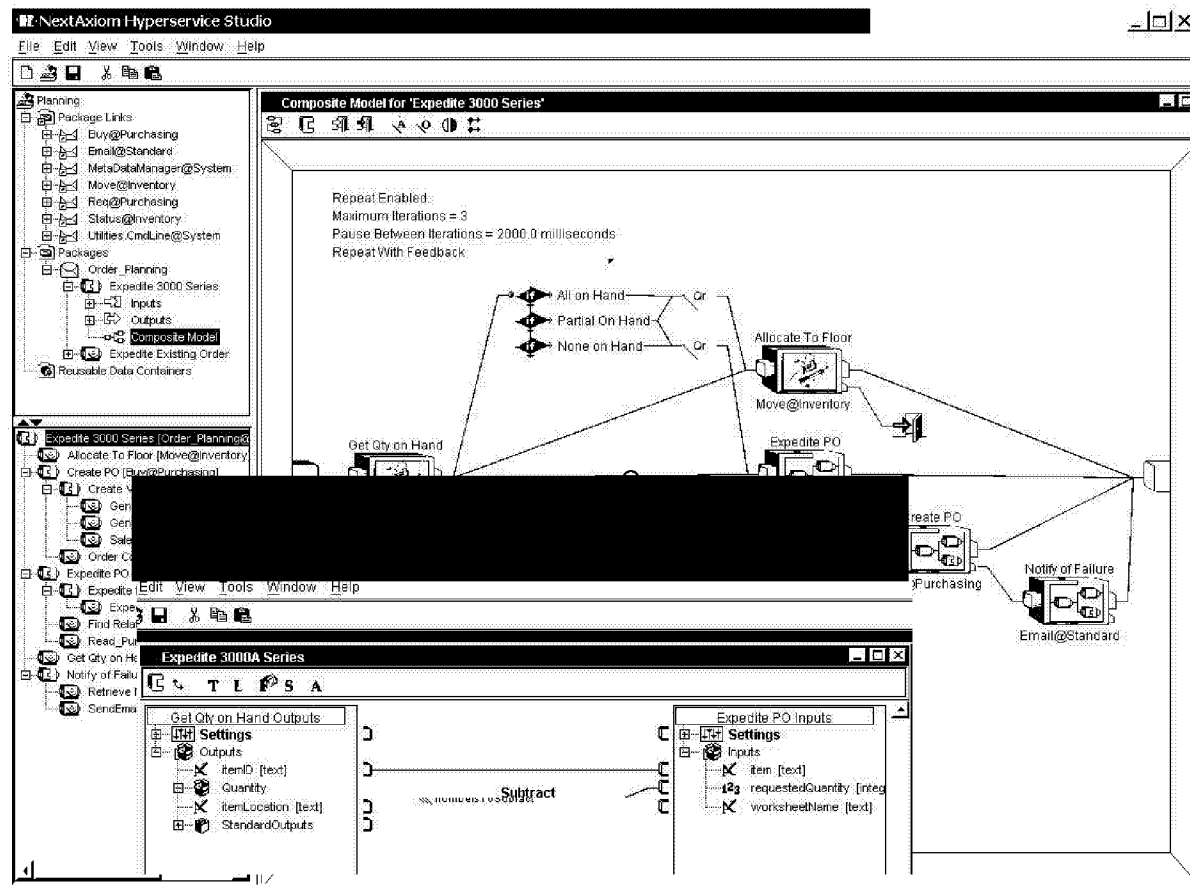


FIGURE 3: Composite service containing other software services

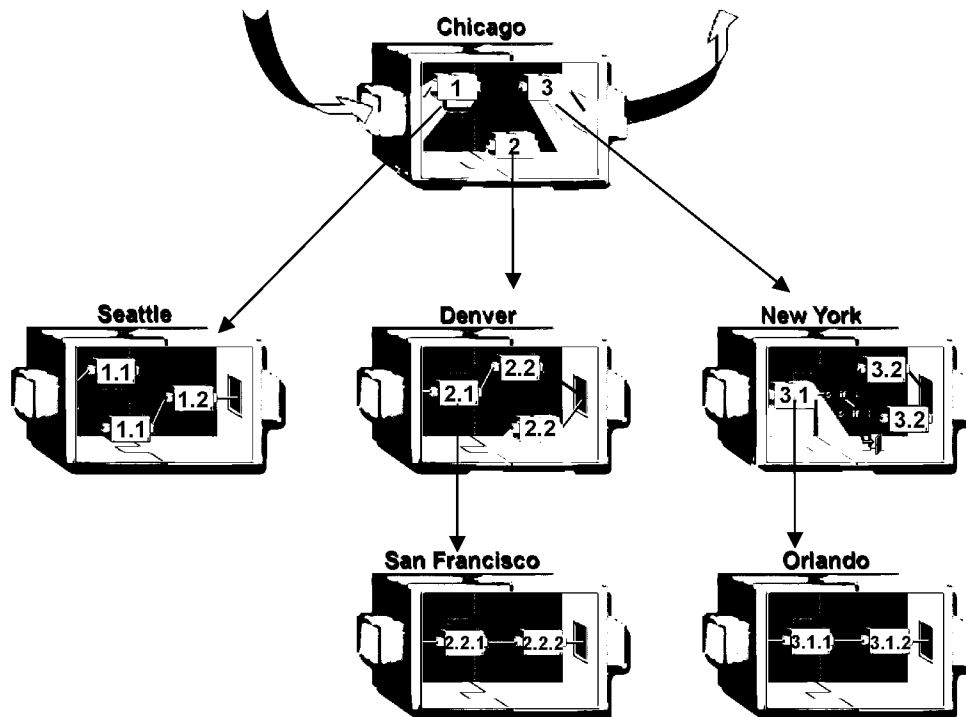


FIGURE 4: Mapping data elements between two connected software services

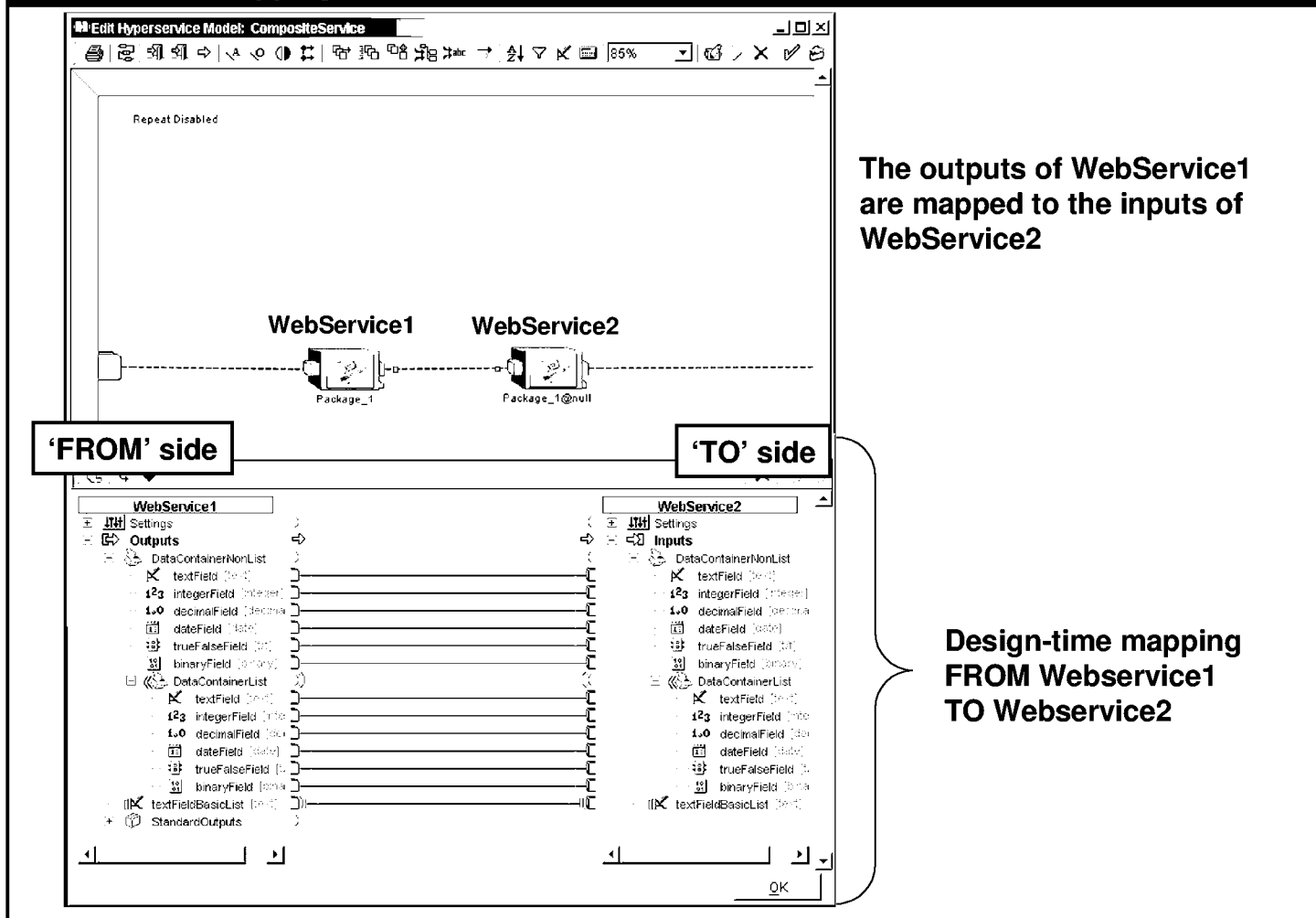
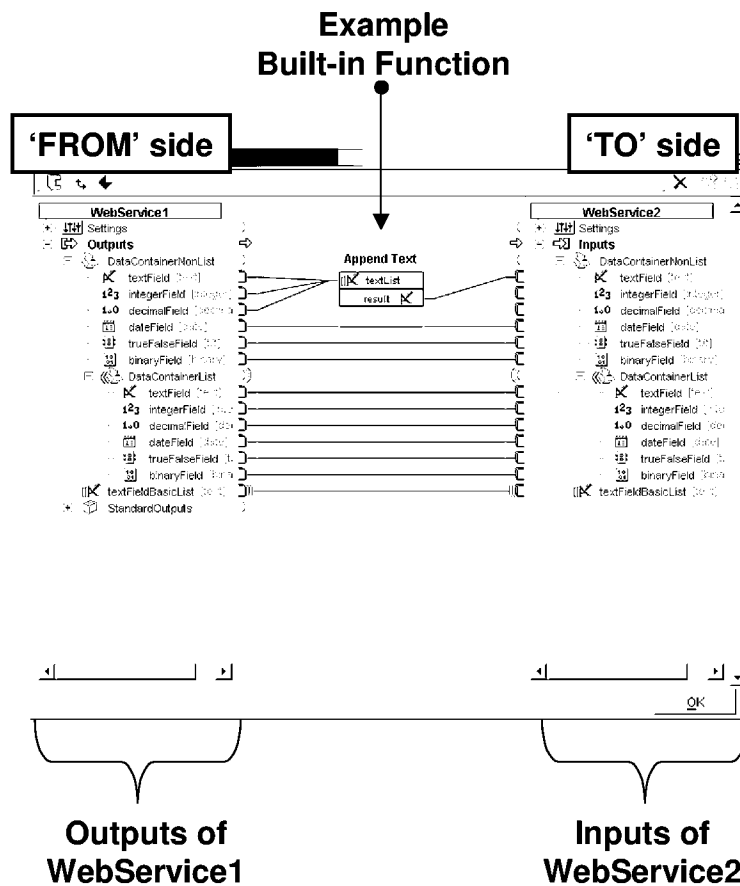


FIGURE 5: XML representation of the mapping depicted in FIGURE 4

```
- <IncomingNode activateUponFailure="false" incomingKey="1000_116_19861858601.1">
- <ToListGroup cpfgLevelForParentTlg="-1" groupAbsPath="Inputs" relativeDataPath="">
- <CPFromGroup groupAbsPath="Outputs" groupDataPath="">
  <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/textField" fromDataPath="DataContainerNonList/textField"
    toAbsPath="Inputs/DataContainerNonList/textField" toDataPath="DataContainerNonList/textField" />
  <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/integerField" fromDataPath="DataContainerNonList/integerField"
    toAbsPath="Inputs/DataContainerNonList/integerField" toDataPath="DataContainerNonList/integerField" />
  <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/decimalField" fromDataPath="DataContainerNonList/decimalField"
    toAbsPath="Inputs/DataContainerNonList/decimalField" toDataPath="DataContainerNonList/decimalField" />
  <ConnectedPair autoConversionFlag="true" fromAbsPath="Outputs/DataContainerNonList/dateField" fromDataPath="DataContainerNonList/dateField"
    toAbsPath="Inputs/DataContainerNonList/dateField" toDataPath="DataContainerNonList/dateField" />
  <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/trueFalseField" fromDataPath="DataContainerNonList/trueFalseField"
    toAbsPath="Inputs/DataContainerNonList/trueFalseField" toDataPath="DataContainerNonList/trueFalseField" />
  <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/binaryField" fromDataPath="DataContainerNonList/binaryField"
    toAbsPath="Inputs/DataContainerNonList/binaryField" toDataPath="DataContainerNonList/binaryField" />
  <ConnectedPair fromAbsPath="Outputs/textFieldBasicList" fromDataPath="textFieldBasicList" isFromDataList="true" isToDataList="true"
    toAbsPath="Inputs/textFieldBasicList" toDataPath="textFieldBasicList" />
  <groupDataPathSegments numSegments="0" postDotConversion="true" />
</CPFromGroup>
- <ToListGroup cpfgLevelForParentTlg="-1" groupAbsPath="Inputs/DataContainerNonList/DataContainerList"
  relativeDataPath="DataContainerNonList/DataContainerList">
- <CPFromGroup groupAbsPath="Outputs/DataContainerNonList/DataContainerList" groupDataPath="DataContainerNonList/DataContainerList">
  <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/DataContainerList/textField" fromDataPath="textField"
    toAbsPath="Inputs/DataContainerNonList/DataContainerList/textField" toDataPath="textField" />
  <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/DataContainerList/integerField" fromDataPath="integerField"
    toAbsPath="Inputs/DataContainerNonList/DataContainerList/integerField" toDataPath="integerField" />
  <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/DataContainerList/decimalField" fromDataPath="decimalField"
    toAbsPath="Inputs/DataContainerNonList/DataContainerList/decimalField" toDataPath="decimalField" />
  <ConnectedPair autoConversionFlag="true" fromAbsPath="Outputs/DataContainerNonList/DataContainerList/dateField" fromDataPath="dateField"
    toAbsPath="Inputs/DataContainerNonList/DataContainerList/dateField" toDataPath="dateField" />
  <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/DataContainerList/trueFalseField" fromDataPath="trueFalseField"
    toAbsPath="Inputs/DataContainerNonList/DataContainerList/trueFalseField" toDataPath="trueFalseField" />
  <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/DataContainerList/binaryField" fromDataPath="binaryField"
    toAbsPath="Inputs/DataContainerNonList/DataContainerList/binaryField" toDataPath="binaryField" />
  <groupDataPathSegments numSegments="1" postDotConversion="true">
    <Segment dataPath="DataContainerNonList/DataContainerList" index="0" />
  </groupDataPathSegments>
</CPFromGroup>
</ToListGroup>
</ToListGroup>
</IncomingNode>
```

FIGURE 6: Mapping between two software services with a Built-in Function in between



Design-time mapping FROM Webservice1 TO Webservice2, similar to FIGURE 4, except with a Built-in Function in between that will append data from multiple data elements into one.

FIGURE 7: XML representation of the Built-in Function mapping depicted in FIGURE 6

```

- <IncomingNode activateUponFailure="false" incomingKey="1000_116_19861858601.1">
- <ToListGroup cpfgLevelForParentTlg="-1" groupAbsPath="Inputs" relativeDataPath="">
- <CPFromGroup groupAbsPath="Outputs" groupDataPath="">
  <ConnectedPair autoConversionFlag="true" fromAbsPath="Outputs/DataContainerNonList/dateField" fromDataPath="DataContainerNonList/dateField"
    toAbsPath="Inputs/DataContainerNonList/dateField" toDataPath="DataContainerNonList/dateField" />
  <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/trueFalseField" fromDataPath="DataContainerNonList/trueFalseField"
    toAbsPath="Inputs/DataContainerNonList/trueFalseField" toDataPath="DataContainerNonList/trueFalseField" />
  <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/binaryField" fromDataPath="DataContainerNonList/binaryField"
    toAbsPath="Inputs/DataContainerNonList/binaryField" toDataPath="DataContainerNonList/binaryField" />
  <ConnectedPair fromAbsPath="Outputs/textFieldBasicList" fromDataPath="textFieldBasicList" isFromDataList="true" isToDataList="true"
    toAbsPath="Inputs/textFieldBasicList" toDataPath="textFieldBasicList" />
  <groupDataPathSegments numSegments="0" postDotConversion="true" />
- <TransformationNode categoryName="Transform" incomingCpfgAbsPath="Outputs" outgoingTlgAbsPath="Inputs" transformationName="Append Text">
- <OutgoingCPairs>
  <ConnectedPair fromDataIndex="0" toAbsPath="Inputs/DataContainerNonList/textField" toDataPath="DataContainerNonList/textField" />
</OutgoingCPairs>
- <IncomingCPairs>
  <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/textField" fromDataPath="DataContainerNonList/textField" isToDataList="true"
    toDataIndex="0" />
  <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/integerField" fromDataPath="DataContainerNonList/integerField" isToDataList="true"
    toDataIndex="0" />
  <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/decimalField" fromDataPath="DataContainerNonList/decimalField" isToDataList="true"
    toDataIndex="0" />
</IncomingCPairs>
  <![CDATA[ x=90,y=52,largeIcon=true ]]>
</TransformationNode>
</CPFromGroup>
- <ToListGroup cpfgLevelForParentTlg="-1" groupAbsPath="Inputs/DataContainerNonList/DataContainerList" relativeDataPath="DataContainerNonList/DataContainerList">
- <CPFromGroup groupAbsPath="Outputs/DataContainerNonList/DataContainerList" groupDataPath="DataContainerNonList/DataContainerList">
  <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/DataContainerList/textField" fromDataPath="textField"
    toAbsPath="Inputs/DataContainerNonList/DataContainerList/textField" toDataPath="textField" />
  <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/DataContainerList/integerField" fromDataPath="integerField"
    toAbsPath="Inputs/DataContainerNonList/DataContainerList/integerField" toDataPath="integerField" />
  <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/DataContainerList/decimalField" fromDataPath="decimalField"
    toAbsPath="Inputs/DataContainerNonList/DataContainerList/decimalField" toDataPath="decimalField" />
  <ConnectedPair autoConversionFlag="true" fromAbsPath="Outputs/DataContainerNonList/DataContainerList/dateField" fromDataPath="dateField"
    toAbsPath="Inputs/DataContainerNonList/DataContainerList/dateField" toDataPath="dateField" />
  <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/DataContainerList/trueFalseField" fromDataPath="trueFalseField"
    toAbsPath="Inputs/DataContainerNonList/DataContainerList/trueFalseField" toDataPath="trueFalseField" />
  <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/DataContainerList/binaryField" fromDataPath="binaryField"
    toAbsPath="Inputs/DataContainerNonList/DataContainerList/binaryField" toDataPath="binaryField" />
  <groupDataPathSegments numSegments="1" postDotConversion="true">
    <Segment dataPath="DataContainerNonList/DataContainerList" index="0" />
  </groupDataPathSegments>
</CPFromGroup>
</ToListGroup>
</ToListGroup>
</IncomingNode>

```

The XML element, 'TransformationNode', represents the Built-in Function depicted in FIGURE 6

FIGURE 8: mapping between a software service and an example software construct

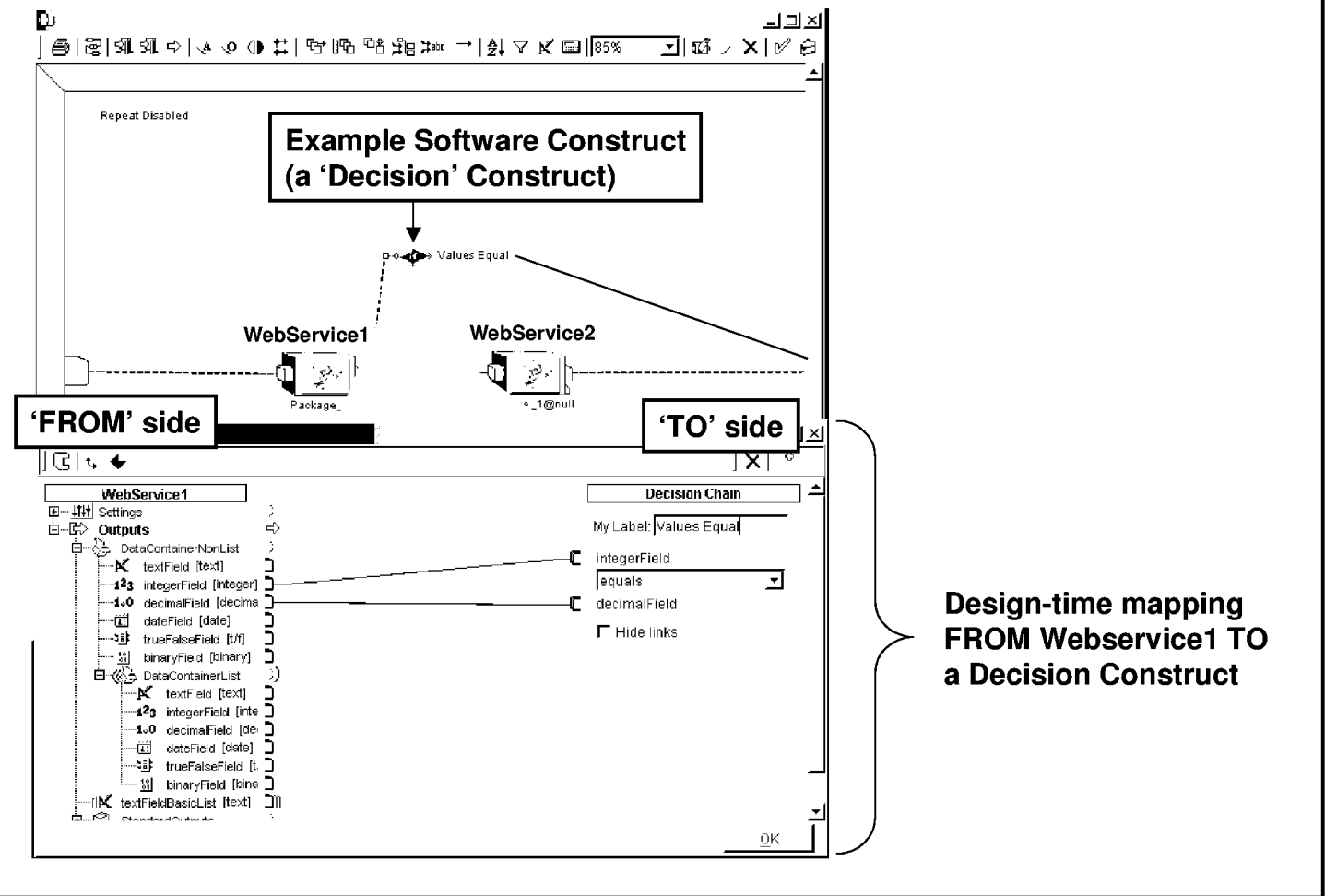
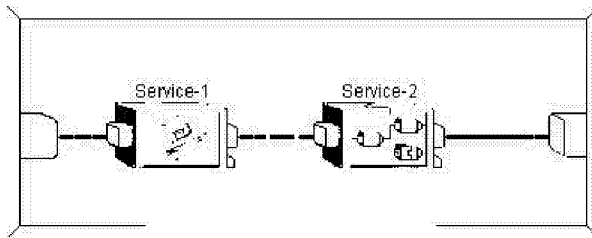


FIGURE 9: XML representation of mapping to a Decision Construct depicted in FIGURE 8

```
- <DecisionConstruct id="3" occurrence="1">
  <IncomingNode activateUponFailure="false" incomingKey="1000_116_19861858601.1" />
  <![CDATA[ x=372,y=189,  ]]>
- <DecisionBranch branchType="IF" customLabel="Values Equal" lhsIncomingKey="1000_116_19861858601.1" operator="equals" rhsIncomingKey="1000_116_19861858601.1"
  useCustomLabel="true">
- <LHS_OR_Common>
  - <CPFromGroup groupAbsPath="Outputs" groupDataPath="">
    <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/integerField" fromDataPath="DataContainerNonList/integerField" toDataIndex="0" />
    <groupDataPathSegments numSegments="0" postDotConversion="true" />
  </CPFromGroup>
</LHS_OR_Common>
- <RHS>
  - <CPFromGroup groupAbsPath="Outputs" groupDataPath="">
    <ConnectedPair fromAbsPath="Outputs/DataContainerNonList/decimalField" fromDataPath="DataContainerNonList/decimalField" toDataIndex="1" />
    <groupDataPathSegments numSegments="0" postDotConversion="true" />
  </CPFromGroup>
</RHS>
</DecisionBranch>
<DecisionBranch branchType="else" customLabel="My Label" operator="equals" />
</DecisionConstruct>
```

The XML element, 'DecisionConstruct', represents the Decision Construct depicted in FIGURE 8

Figure 10: Mapping that results in data “flattening”



DESIGN-TIME:

Defining how data should be transferred from Service-1 to Service-2. Mappings where data is flattened is marked by an asterisk(*)

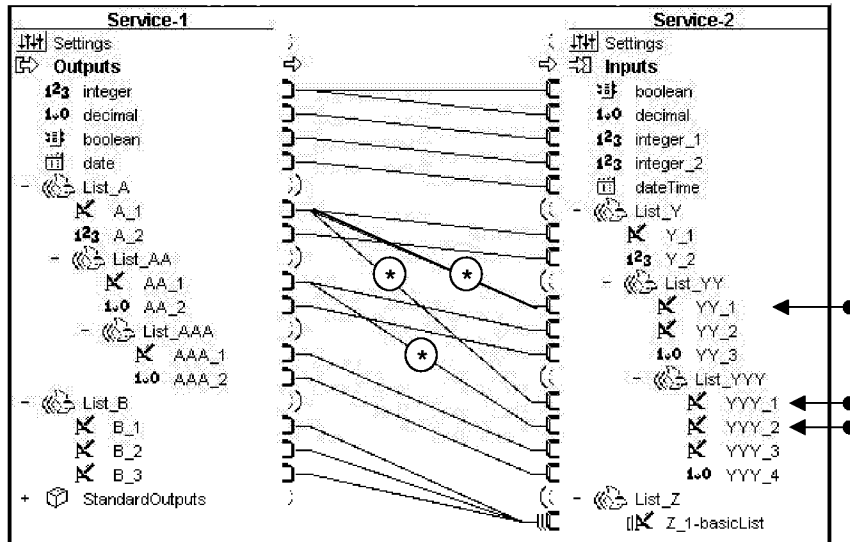


FIGURE 12: Defining One-to-Many and Many-to-One Data Mapping between services

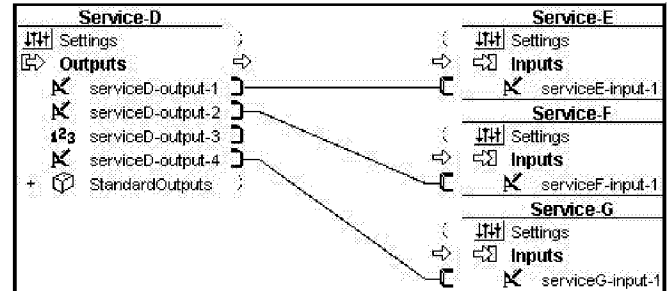
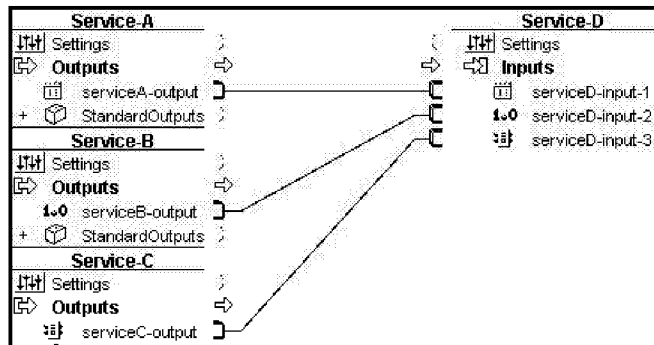
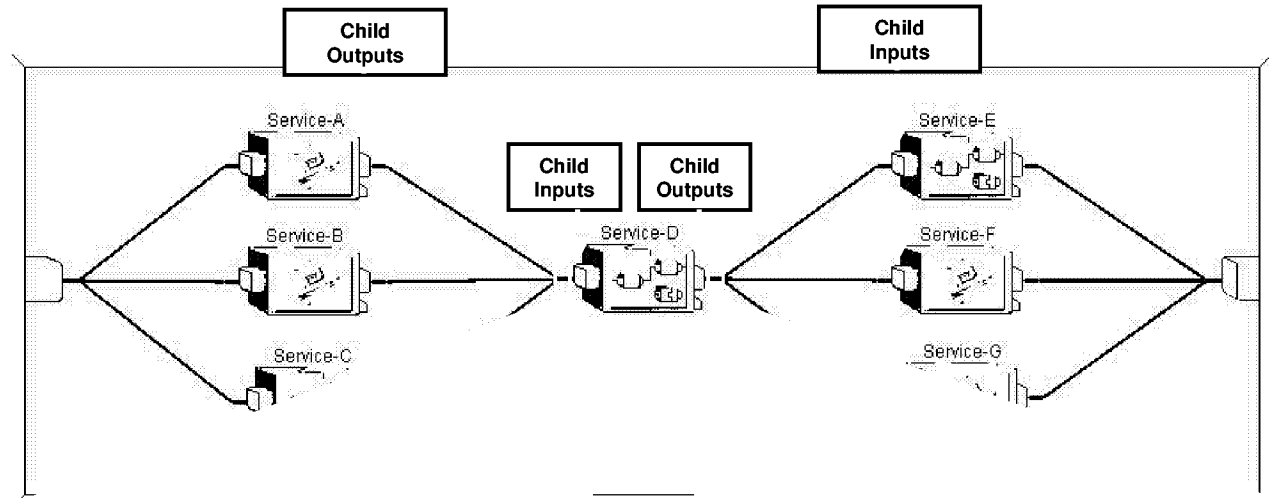
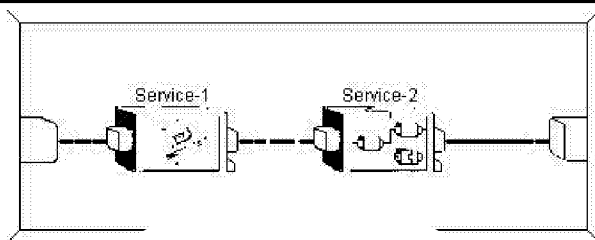
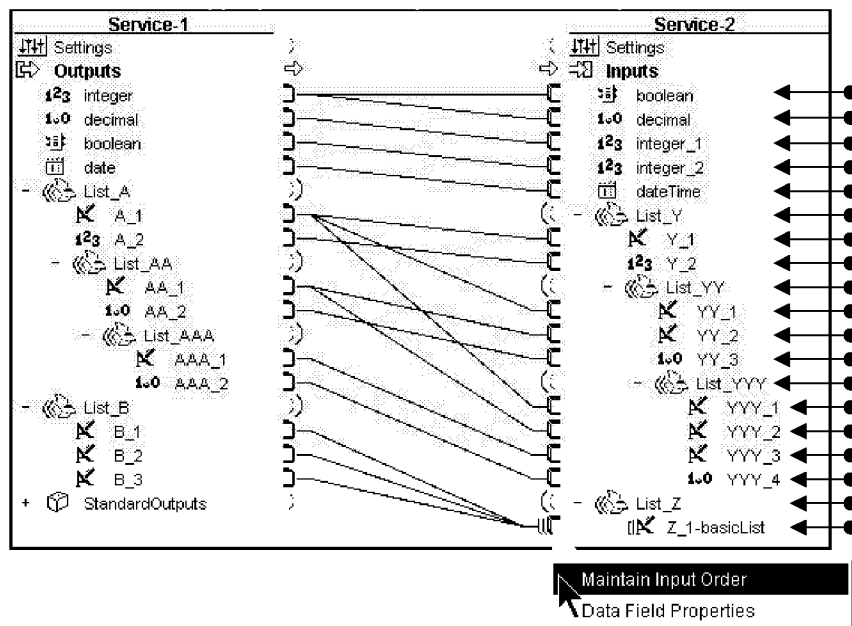


Figure 13A: Design-time – Defining Data Mapping with implicit data conversion

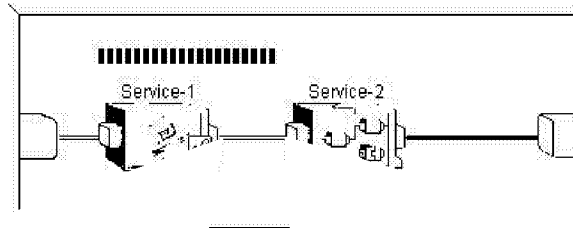


DESIGN-TIME:
Defining how data should be transferred from Service-1 to Service-2



B_1, B_2, B_3 (order can be defined)

Figure 13B: Run-time – Automatic Data Transfer & Data Conversion



RUN-TIME:

Data is automatically transferred (and converted when necessary) from Service-1 Outputs to Service-2 Inputs

Modify/Evaluate: Service-1 Outputs

Evaluate/Modify Outputs

Service-1 Outputs	1
integer	0
decimal	10.5
boolean	true
date	JAN-03-2003
List_A	1 2 3
A_1	A_1 item 1
A_2	1
List_AA	1 2
AA_1	AA_1 item 1
AA_2	1.1
List_AAA	1 2 3 4
AAA_1	AAA_1 item 1
AAA_2	1.11
List_B	1 2 3
B_1	B_1 item 1
B_2	B_2 item 1
B_3	B_3 item 1

Modify/Evaluate: Service-2 Inputs

Evaluate/Modify Inputs

Service-2 Inputs	1
boolean	false
decimal	0
integer_1	11
integer_2	1
dateTime	2003/01/03 00:00:00.000
List_Y	1 2 3
Y_1	A_1 item 1
Y_2	1
List_YY	1 2
YY_1	A_1 item 1
YY_2	AA_1 item 1
YY_3	1.1
List_YYY	1 2 3 4
YYY_1	A_1 item 1
YYY_2	AA_1 item 1
YYY_3	AAA_1 item 1
YYY_4	1.11
List_Z	1 2 3
Z_1-basicList	B_1 item 1, B_2 item 1, B_3 item 1

B_1 item 1
B_2 item 1
B_3 item 1